DYNAMICS OF CHIRAL SYMMETRY BREAKING IN ROTATING NUCLEI

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Nuclear rotation attains a chiral character if the angular momentum vector lies outside the three planes spanned by the principal axes of a triaxial nucleus [1,2]. The existence of a left-handed and a right-handed configuration is reflected by two nearly degenerate $\Delta I = 1$ bands of the same parity. Unlike in chiral molecules, there is a rapid motion between the left- and right-handed configuration, which leads to an energy split between the sister bands and modifies the electromagnetic transition rates between the states. The dynamics and statics of the orientation of the angular momentum with respect to the triaxial density distribution is studied by means of a model that couples a particle and a hole to a triaxial rotor [1]. The frozen alignment approximation further simplifies the analysis. It assumes that the angular momenta of the particle and the hole are rigidly aligned with the respectively short and long axes. The classical orbits of the angular momentum vector are constructed. They permit a classification into chiral vibrations (slow oscillations around an achiral equilibrium position) and chiral rotation (tunneling between left- and right-handed configurations). The separatrix orbit marks the border between the two regimes, which defines the stability criterion of chiral rotation. The sum of the interband and intraband transition strength is given by classical radiation strength, which can be calculated by means of the Tilted Axis Cranking model in a microscopic way. The distribution of the classical transition strength between intra and interband transitions is determined by quantal phase relations. As demonstrated by Fig. 1, it depends sensitively on the model parameters. The origin of these rapid changes and its consequences for experimental finger prints of chirality will be discussed.

[1] S. Frauendorf and J. Meng, Nucl. Phys. **A617**, 131 (1997).

[2] S. Frauendorf, Rev. Mod. Phys. **73**, 463 (2001).

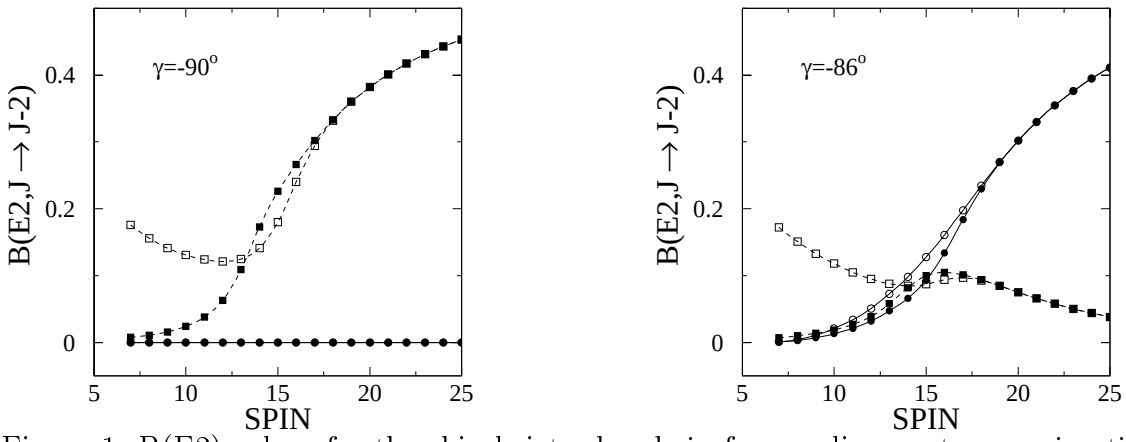

Figure 1: B(E2) values for the chiral sister bands in frozen alignment approximation. Solid lines: intraband transitions, dashed lines: interband transitions. Full (open) symbols refers to starting from yrast (yrare) band.